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Involuntary Excess Reserve and Bankers' Remuneration: Evidence from Chinese Banks

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Abstract: *This paper analyses the effects of involuntary excess reserves on bankers' remuneration and the penalty associated with bank risk-taking if discovered. The study finds that involuntary excess reserves help conceal tail risks, improves bankers' performance and remuneration. However, the risks once discovered result in heavy penalties on bankers' remuneration. The study extends the agency theory to the context where banks hold large involuntary excess reserves.*

GEL: G20, G21

Keywords: excess reserves, tail risk, remuneration, Chinese banks

1. Introduction

Policy makers, bank supervisors and academics widely acknowledge that remuneration schemes put in place by banks can provide incentives to exploit deficiencies in internal controls to enhance the short-term bank performance often tied to remuneration (Kashyap et al., 2008; Ellul and Yarramilli, 2013). While bank remuneration is hotly debated in both academic and practitioner milieu in advanced market economies such as US and UK, relatively little is known in an emerging market environment where involuntary excess reserves[1] are present. Recent literature on excess reserves have focused on the implications of involuntary accumulation of liquid reserves on risk-taking behaviours of commercial banks and effectiveness of monetary policy (see Agenor and Aynaoui, 2010; Nguyen and Boateng, 2013, 2015). These studies document that banks with large involuntary excess reserves tend to take more risks and are more vulnerable to tightening monetary policy shocks. This is against the backdrop that excess reserves literature indicates that, involuntary excess reserves

[1] current account holdings with the central banks beyond statutory required and precautionary levels (Agenor et al., 2004)

provide a latitude for banks to conceal tail risks, that is, the kinds of risks that generate severe adverse consequences with small probability of being detected but, in return, offer generous compensation the rest of the time (Rajan, 2006). It is therefore argued that, the abundance of unwarranted liquidity may not only exacerbate risk-taking behaviour and exert positive effect on bankers' remuneration but may also facilitate the concealment of tail risks. This is because banks with large involuntary excess reserves may engender bank risk taking, enhance short-term bank performance which is often linked to bankers' remuneration.

This paper is the first attempt to examine the impact of involuntary excess reserves on bankers' remuneration and the extent to which involuntary excess reserves can facilitate the concealment of tail risk. The study has major contributions on two fronts. First, the study extends principal-agent theories to the context where banks hold large involuntary excess reserves to clarify the incentive for bankers to take tail risks. We argue that, due to principal-agent problem, bankers may take advantage of involuntary excess reserves and its ability to conceal risks easily to enhance bankers' performance, thereby improving bankers' remuneration. Second, the study sheds lights on the relationship between risk and remuneration management of Chinese banks which hold large involuntary excess reserves. We contend that risks that cannot be concealed by involuntary excess reserves may result in heavy penalties to bankers' remuneration.

The remainder of the paper is structured as follows. Section 2 presents the context and theoretical background of the study. Section 3 discusses research methodology and data collection. Section 4 presents data analysis and estimation results. Section 5 concludes the study.

2. Context and Theoretical Background

2.1 Involuntary Excess Reserves in China

We choose China as the research context as a large amount of excess reserves has been accumulated in the Chinese banking system over the past decades, resulted mainly from the large capital inflows and trade surplus (Bouvatier, 2010). The aggregate excess reserves in the Chinese banking system accounted around 10% of deposits during 1990s and early 2000s (Anderson, 2009). Although this ratio gradually fell down to 3.3% in 2012, it is still considered high compared to that of banks in the U.S. and European countries (Anderson, 2009; Nguyen and Boateng, 2015).

2.2 Background Literature

Acharya and Naqvi (2012) developed the excess liquidity theory to analyse how agency problems affect the aggressive lending behaviours of banks in an environment where banks are awash with liquidity. It is argued that excess liquidity creates the condition where illiquidity risk becomes less likely, thereby making tail risks easier to be concealed (Agenor et al., 2004; Rajan, 2006; Nguyen and Boateng, 2013; 2015; Nguyen et al., 2015). Acharya and Naqvi (2012) posit that bankers' remuneration is an increasing function of loan volume but negatively related to the tail risks that bankers take. As the latter can be verified by costly audit process, banks find it optimal to carry out auditing only when liquidity shortfall reaches a certain alarming threshold (Acharya and Naqvi, 2012).

As involuntary excess reserves are deemed unwanted liquidity or excess liquidity condition (Agenor et al., 2004), and consistent with prior literature, we contend that the presence of involuntary excess reserves creates the perception of low illiquidity risk probability and conceals easily potential tail risks, hence, enhances bankers' performance. We therefore hypothesise that involuntary excess reserves have a positive impact on bankers' remuneration and that the tail risks are unlikely to be concealed resulting in severe consequences. The

above hypothesis is in line with the recent findings of Nguyen and Boateng (2013, 2015) who demonstrated that tightening monetary policy reduces banks' holding of involuntary excess reserves, making them less capable of concealing risks, and as the results, their risks materialise rapidly and severely. This point supports the conclusion drawn by Rajan (2006) who notes that tail risks have low probability of being discovered but result in severe consequences. We argue that, the tail risks that cannot even be concealed in the context where involuntary excess reserves are present tend to result in severe consequences. Therefore, we hypothesise that risk has a negative impact on remuneration, and that the interaction of risk and involuntary excess reserves has a significantly negative impact on bankers' remuneration.

3. Methodology and Data

3.1 Data

We collect banking data from Fitch's International Bank Database (Bankscope) for the period from 2000 to 2013. We only include banks whose data are available for at least three consecutive years. We only consider commercial banks, other types of banks (policy banks, cooperative banks and investment banks) are excluded as they may pursue different objectives rather than profitability. The final sample consists of 72 banks with 334 annual observations. Macro data are collected from National Bureau of Statistics of China.

3.2 Econometric Model

Following Acharya and Naqvi (2012), we use the following model to capture the impact of involuntary excess reserves on bankers' remuneration:

$$REM_{it} = \alpha_i + \beta_1 REM_{i,t-1} + \beta_2 GL_{i,t-1} + \beta_3 IER_{i,t-1} + \beta_4 RISK_{i,t-1} + \beta_5 IER_{i,t-1} \times RISK_{i,t-1} + \beta_6 ROA_{t-1} + \beta_7 GDP_{t-1} + \varepsilon_{it}$$

We measure involuntary excess reserves (IER) as the difference between actual excess reserves that banks hold and predicted excess reserves (Nguyen and Boateng, 2013, 2015). Following the models of Agenor et al. (2004), Aikaeli (2011), and Nguyen and Boateng

(2013, 2015), excess reserve is regressed on its first lag, loan return volatility, cash-holding preference of depositors, reserve requirement ratios, penalty rate on reserve shortage, and real GDP growth rate to capture the economy's demand for cash. System Generalised Method of Moments (SGMM) developed by Arellano and Bond (1991), Arellano and Bover (1995); Blundell and Bond (1998) is used as endogeneity problems exists in the model of excess reserves. Involuntary excess reserves are collected as residuals of the regressions. The regression model for excess reserves is reported in Appendix 1.

Bankers' remuneration (REM) is measured as the ratio of personnel expenses to total assets. Personnel expenses include wages and salaries, social security costs, pension expenses and other personnel costs, including the expensing of staff stock options. Acharya and Naqvi (2012) argue that bankers are remunerated on the basis of loan volume they generated (GL) and risks that they take (RISK). Loan volume (GL) is measured as the log of gross loans. The risks (RISK) is indexed alternatively by non-performing loan ratio (NPL) measured as a ratio of non-performing loans to gross loans, and by loan loss provision ratio (LLP) measured as a ratio of loan loss provision to net interest revenue. To capture the profit, return on assets (ROA) is used. To ensure the robustness, return on equity (ROE) is also employed in separated regressions. The model also include real GDP growth rate (GDP) to reflect economic conditions. Table 1 summarises the statistics for the variables. All the variables are stationary. SGMM is employed for the estimations of bankers' remuneration to address the endogeneity problem. The model residuals are free of serial correlation and unit root.

Table 1: Summary Statistics for Bankers' Remuneration Regression Variables

Variable	Mean	Std. Dev.	Skewness	Kurtosis	Min	Max	Jarque-bera
REM	0.006	0.002	0.847	1.341	0.002	0.014	88.82*
GL	10.752	2.019	0.486	0.248	5.447	16.11	28.17*
NPLR	0.025	0.04	3.965	20.584	0	0.38	1100*
LLPR	0.147	0.128	-0.32	7.835	-0.78	0.67	17549*
IER	0	0.049	0.553	3.371	-0.192	0.2332	281.9*
ROA	0.009	0.006	-1.218	11.728	-0.042	0.03	3733*
ROE	0.144	0.133	-6.257	98.041	-0.668	0.83	250000*
GDP	0.099	0.019	0.939	0.624	0.077	0.142	1.629

Note: * denotes the rejection of normal distribution at the 1% significance level

4 Estimation Results and Robustness Tests

The regression results are reported in Table 2. We find involuntary excess reserves have a significant positive impact on bankers' remuneration. This supports the hypothesis that involuntary excess reserves help conceal tail risks, enhance bankers' performance, and hence, increase bankers' remuneration. On the other hand, discovered risks have a negative relationship with remuneration. This is in line with the argument of Acharya and Naqvi (2012) that bankers receive penalty on the risks they take. The interaction of involuntary excess reserves and risk is negative. The negative impact is statistically significant at the level of 5% when loan loss provision is used to index risk, and becomes more significant at the level of 1% for the case of non-performing loan as an index of risk. This implies that, in the presence of involuntary excess reserves, bankers are penalised more heavily for the discovered risks. This supports the hypothesis that the tail risks that cannot be concealed by involuntary excess reserves result in severe consequences.

Table 2: Bankers' Remuneration Regression Results

Dependent variable: REM	**RISK = LLP**		**RISK = NPL**	
Constant	0.003** (0.001)	-0.0035* (0.002)	0.00009 (0.002)	0.0002 (0.002)
REM (lag-1)	0.467*** (0.138)	0.96*** (0.103)	0.79*** (0.133)	0.779*** (0.125)
GL	0.00004 (0.0001)	0.00024* (0.00012)	0.00003 (0.0001)	0.00003 (0.0001)
IER	0.006* (0.003)	0.006** (0.003)	0.0056* (0.003)	0.006* (0.004)
RISK	-0.002* (0.001)	-0.0002 (0.001)	-0.008* (0.004)	-0.009** (0.004)
IER*RISK	-0.04** (0.02)	-0.04** (0.02)	-0.319*** (0.118)	-0.322*** (0.122)
ROA	-0.06* (0.034)	-0.03 (0.034)	-0.04 (0.03)	-0.032 (0.047)
ROE		-0.0001 (0.0002)		-0.0008 (0.001)
GDP	0.007** (0.003)	0.013*** (0.004)	0.013*** (0.003)	0.013*** (0.004)
No. of observations	334	334	313	313
No. of banks	72	72	71	71
No. of instruments	50	37	68	65
Hansen p-value	0.808	0.424	865	0.658

Note: 1. ***, ** and * denote statistical significance at the 1%, 5% and 10% significance levels, respectively.

2. Robust standard errors are reported in parentheses.

To ensure the robustness of the results, bank ownership structure (state-owned banks, non-state-owned banks and foreign banks) is included to capture the differences in funding sources, operational strategies, technology, efficiency and political intervention (Tabak et al., 2010). In addition, regional real GDP growth rates are used instead of national real GDP growth rates for rural and city commercial banks which tend to operate within their corresponding provinces (Xu, 2011). Finally, a crisis dummy variable (prior to 2008, and from 2008 afterwards) is included to account for any possible effects from the subprime crisis. All the robustness test results are consistent with that of the main regressions. The robustness test results are provided upon request.

5 Conclusion

This study examines the impact of involuntary excess reserves on bankers' remuneration in China. The study finds that involuntary excess reserves help conceal tail risks, and hence, improving bankers' performance and bankers' remuneration. However, the risks that are discovered result in heavy penalties on bankers' remuneration. The results suggest that bankers have incentive to conceal tail risk to enhance their remuneration in an environment where large involuntary excess reserves have been accumulated in the banking system. It is suggested that Chinese central bank should reduce banks' holdings of involuntary excess reserves which have detrimental consequences for financial stability as they provide condition to conceal tail risk easily.

References

Acharya, V., and Naqvi, H. (2012). The Seeds of a Crisis: A Theory of Bank Liquidity and Risk-Taking over the Business Cycle. *Journal of Financial Economics*, *106*(2), 349-366.

Agenor, P.-R. and Aynaoui, K.E. (2010). Excess liquidity, bank pricing rules, and monetary policy, Journal of Banking and Finance, 34 (5), 923-933.

Agenor, P.-R., Aizenman, J., and Hoffmaister, A. W. (2004). The credit crunch in East Asia: what can bank excess liquid assets tell us? *Journal of International Money and Finance*, *23*(1), 27-49.

Aikaeli, J. (2011). Determinants of Excess Liquidity in Tanzanian Commercial Banks. *African Finance Journal*, *13*(1), 47-63.

Anderson, J. (2009). The China monetary policy handbook. *In: Barth, J.R., Tatom,J.A. and Yago,G. (Eds.), China's emerging financial markets - Challenges and opportunities, Milken Institute, CA, USA.*

Arellano, M., and Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, *58*(2), 277–297.

Arellano, M., and Bover, O. (1995). Another look at the instrumental variables estimation of errorcomponents models, *Journal of Econometrics*, *68*(1), 29-51.

Blundell, R., and Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87*, 115-143.

Bouvatier, V. (2010). Hot money inflows and monetary stability in China: how the People's Bank of China took up the challenge. *Applied Economics, 42*(12), 1533-1548.

Ellul, A. and Yerramilli, V. (2013). Stronger risk controls, lower risk: Evidence from U.S. bank holding companies, *Journal of Finance*, 68 (5), 1757-1803.

Hodrick, R., and Prescott, E. C. (1997). Postwar U.S. Business Cycles: An Empirical Investigation. *Journal of Money, Credit and Banking*, *29*(1), 1-16.

Kashyap, A.K., Rajan, R.G. and Stein, J.C. (2008). Rethinking capital regulation, Federal Reserve Bank of Kansas City Symposium on "Maintaining stability in the changing financial system" Jackson Hole, Wyoming,
Available at http://www.kc.frb.org/publicat/sympos/2008/lashyapRajanStein.08.08.08

Nguyen, V. H. T. and Boateng, A. (2013). The Impact of Excess Reserves beyond Precautionary Levels on Bank Lending Channels in China, *Journal of International Financial Markets, Institutions and Money*, *26* (C), 358-377.

Nguyen, V. H. T. and Boateng, A. (2015). An Analysis of Involuntary Excess Reserves, Monetary Policy and Risk-taking Behaviour of Chinese Banks, *International Review of Financial Analysis, 37*, 63-72.

Nguyen, V. H. T., Boateng, A. and Newton, D. (2015). Involuntary Excess Reserve, the Reserve Requirements and Credit Rationing in China, *Applied Economics*, *47*(14), 1424-1437.

Rajan, R. (2006). Has Finance Made the World Riskier? *European Financial Management*, *12*(4), 499–533.

Saxegaard, M. (2006). Excess liquidity and effectiveness of monetary policy: Evidence from Sub-Saharan Africa. *Working Paper No. 06/115, International Monetary Fund*.

Tabak, B., Laizy, M., and Cajueiro, D. (2010). Financial Stability and Monetary Policy – The case of Brazil. *Central Bank of Brazil, Working Paper Series No. 217*.

Xu, Y. (2011). Towards a more accurate measure of foreign bank entry and its impact on domestic banking performance: The case of China. *Journal of Banking and Finance*, *35*(4), 886-901.

Appendices

Appendix 1: Involuntary Excess Reserves Measurement

Following Agenor et al. (2004), and Nguyen and Boateng (2013, 2015), we estimate the demand for precautionary excess reserves from the following model, and the residuals (ε) are considered involuntary excess reserves.

$$ER_{it} = \tau + \alpha_1 ER_{i,t-1} + \alpha_2(L)LR + \alpha_3(L)CASH + \alpha_4(L)GDP + \alpha_5(L)RRR + \alpha_6(L)R + \varepsilon_{it}$$

where τ is a constant term, ε_{it} is a well-behaved error term and $\alpha_j(L)$ are lag polynomials.

Variable	Description	Measurement
ER	Excess reserves	Ratio of the difference between a bank's current account balance with the central bank and required reserve over total customer deposit.
LR	Loan return volatility	Deviation of the ratio loan interest income over total deposits from its trend identified by the filter method developed by Hodrick and Prescott (1997)
CASH	Loan loss provision ratio	Deviation of the ratio of vault cash over total deposits from its trend, estimated by Hodrick-Prescott (1997)
GDP	Real GDP growth rate	Real GDP growth rate
RRR	Reserve requirement ratio	Average reserve requirement ratio with a certain year
R	Penalty rate	Refinance rate which the Chinese central bank charges on 20-day call loans